Freeplay reduction bush for pivot of adjustable vehicle seat

Patent number:	GB2367857
Publication date:	2002-04-17
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Classification:	
- international:	F16C11/00
- european:	B60N2/22; B60N2/20; B60N2/44M3
Application number:	GB20000024597 20001007
Priority number(s):	GB20000024597 20001007

Abstract of **GB2367857**

A bush 9 comprising an annular body with one end face of the body having an axially projecting projection 14 over part of its surface and the other end face of the body also having an axially projecting projection 14 over part of its surface, the two projections 14 being diametrically opposed.. Preferably the projection 14 extend about the circumference of the bush 9, either continuously or dis-continuously, between an angle of 45 deg to 120 deg. The bush 9 is located on a collar 8 of a pin 6 in a hinge bracket 1 of an adjustable or foldable back of a vehicle seat. The bush 9 reduces play and rattles in the hinge 1.

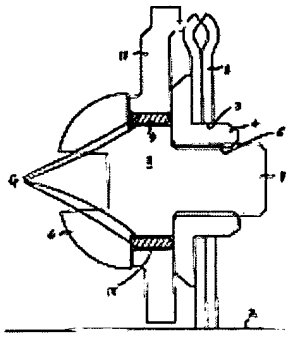

Fig 1

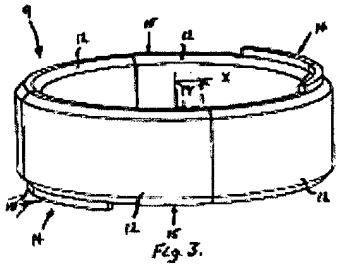

Fig 3.

(12) UK Patent Application (19) GB (11) 2 367 857 (13) A

(43) Date of A Publication 17.04.2002

(21) Application No 0024597.7

(22) Date of Filing 07.10.2000

(51) INT CL[7]
F16C 11/00

(52) UK CL (Edition T)
E2F FEB

(56) Documents Cited
US 5725281 A US 5553922 A

(58) Field of Search
UK CL (Edition R) E2F FEB
INT CL[7] E05D 5/14 , F16C 11/00 11/04 , F16F 1/38
ONLINE: WPI;EPODOC; JAPIO

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(54) Abstract Title
Freeplay reduction bush for pivot of adjustable vehicle seat

(57) A bush 9 comprising an annular body with one end face of the body having an axially projecting projection 14 over part of its surface and the other end face of the body also having an axially projecting projection 14 over part of its surface, the two projections 14 being diametrically opposed.. Preferably the projection 14 extend about the circumference of the bush 9, either continuously or dis-continuously, between an angle of 45 deg to 120 deg. The bush 9 is located on a collar 8 of a pin 6 in a hinge bracket 1 of an adjustable or foldable back of a vehicle seat. The bush 9 reduces play and rattles in the hinge 1.

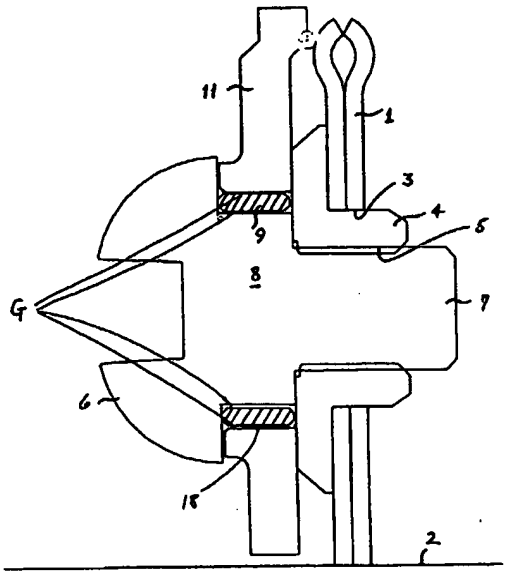

Fig. 1.

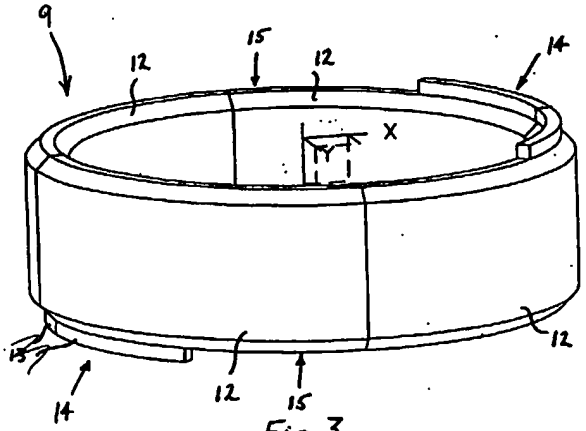

Fig. 3.

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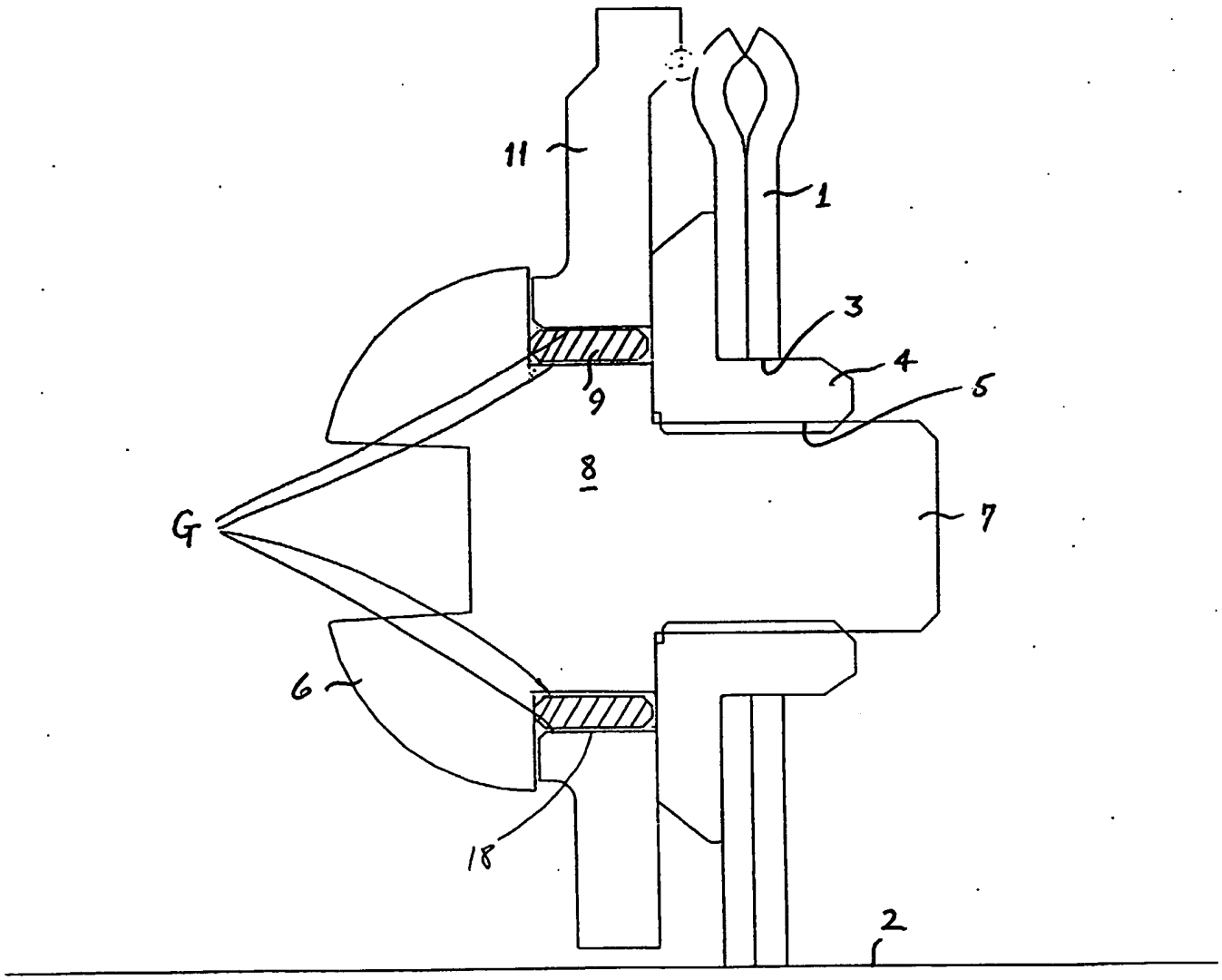

Fig. 1.

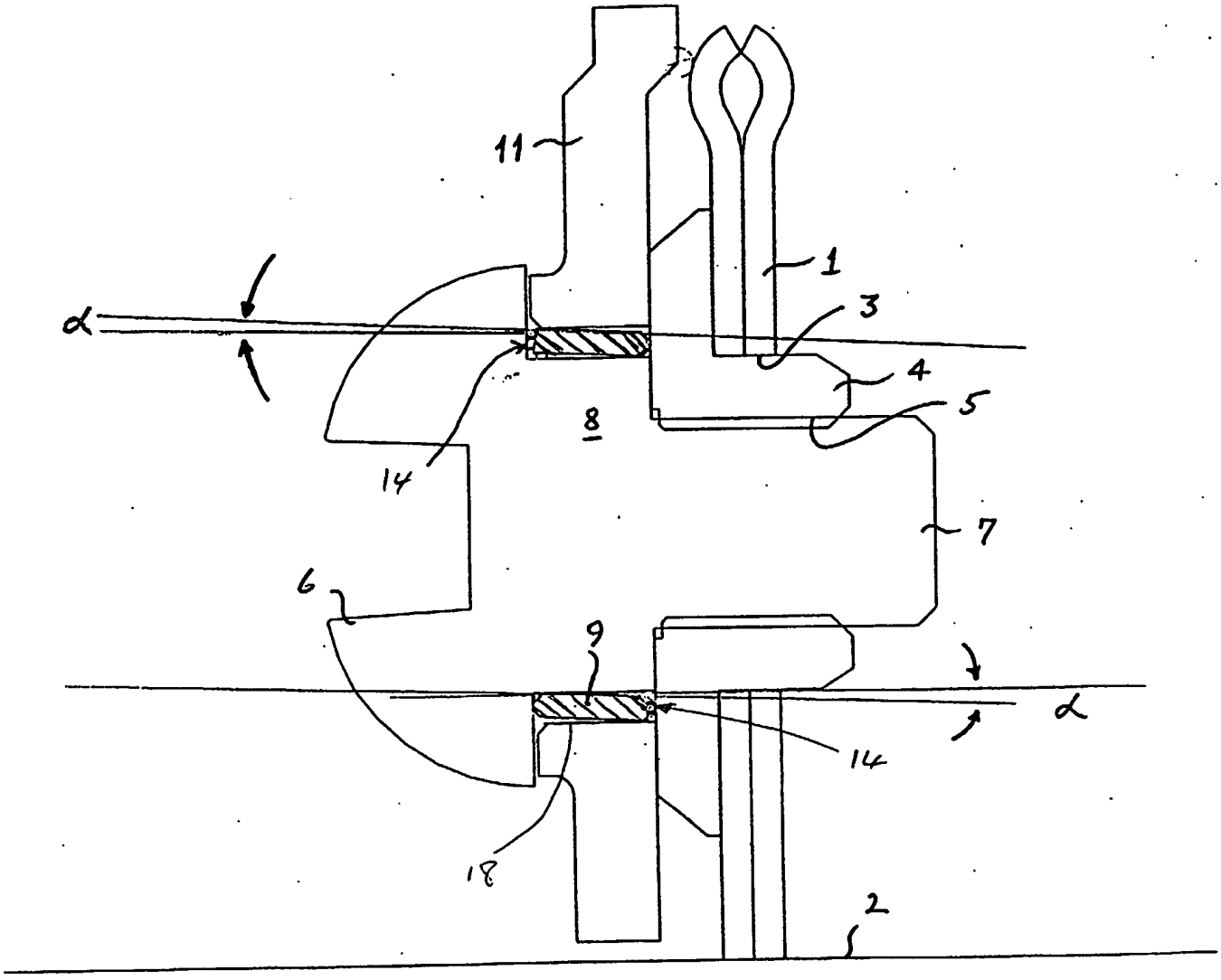

Fig. 2.

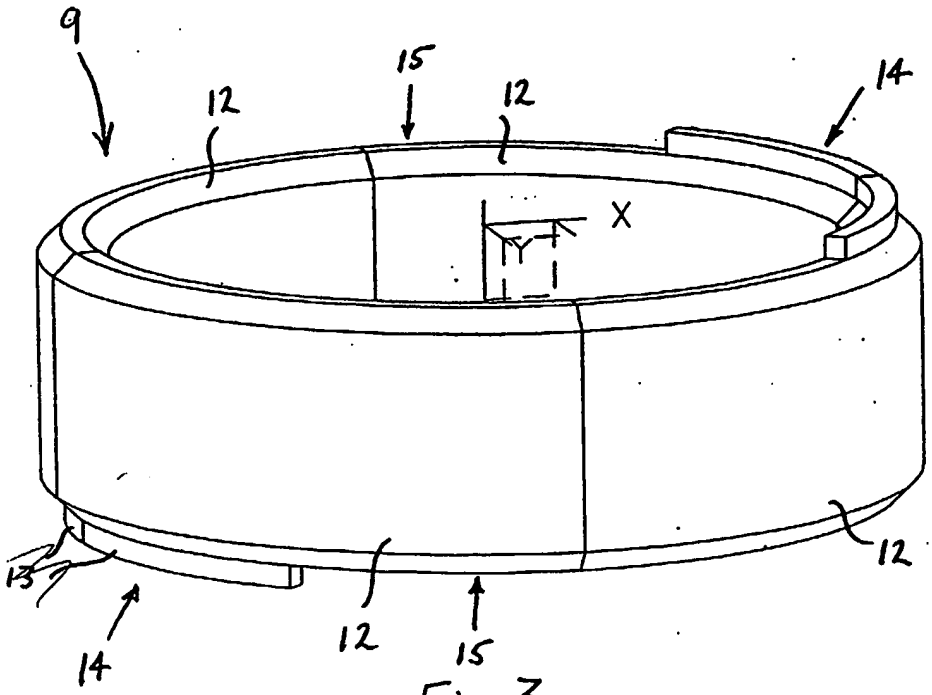

Fig. 3.

REDUCED FREEPLAY BUSH

This invention relates to bushes and has particular, but not exclusive, reference to bushes used in the automobile industry to allow the backs of vehicle seats to be angularly adjusted with respect to the seat cushion.

If a driver or passenger sits in a vehicle and feels freeplay on the pivot for the seat back, it is disconcerting and the object of the present invention is to provide a pivot bush which, when fitted in a pivot assembly reduces significantly, if not eliminates, freeplay in that pivot assembly.

It is well known that freeplay occurs in pivot assemblies due to tolerance stack-up of the component parts of the assemblies. Attempts have been made, to some good effect, to reduce pivot freeplay, for example by producing components to a high tolerance but this can be expensive.

According to the present invention there is provided a bush comprising an annular body with one end face of the body having an axially-extending projection over part of its surface, and the other end face of the body also having an axially-extending projection over part of its surface, the two axially-extending projections being generally diametrically opposed.

In use, the bush is placed under axial compression by being located between opposed axially facing shoulders which are axially movable relative to one another.

The projections thus impart a tilt or cant to the bush when in use in, say a pivot assembly, this tilt or cant serving to take up any tolerance build-up in the assembly and thus significantly reduce, if not eliminate, freeplay in the pivot assembly.

Preferably, the bush comprises a unitary the annular body. The projections may extend continuously or discontinuously on each end face of the bush about the circumference of the body.

A bush in accordance with the present invention will now be described in greater detail, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a cross-section of a pivot assembly featuring a standard bush;

Figure 2 is a similar cross-section to that of Figure 1 but featuring a bush in accordance with the present invention; and

Figure 3 is a perspective view to a larger scale of the bush of Figure 2.

Referring first to Figure 1, this hour pivot assembly is designed for an adjustable or foldable back of a vehicle seat and comprises a hinge bracket 1 attached to the floor 2 of the vehicle and being apertured at 3 to receive, and being fixedly attached thereto, a boss 4 having a central and threaded aperture 5.

The boss 4 receives a pivot pin 6 having a threaded portion 7 which co-operates with the threaded aperture 5 of the boss to secured the pin 6 in position. The pin 6 also has a collar 8 which defines a shaft having a pivot surface of the pivot assembly. A bush 9 is mounted on the collar 8 and the seat (not shown) is pivotally mounted on the collar and bush 9 by way of an apertured side plate 11 of the seat. The side plate 11 includes a bore 18 through which the pin 6 passes.

Typically, the normal tolerance stack-up of the pin 6, bush 9 and the bore 18 of side plate 11 results in gaps G which produce undesirable freeplay in the pivot assembly.

Turning now to Figure 2, the pivot assembly shown is identical to that of Figure 1, and similar reference numerals are used, except for the bush 9 which is constructed in accordance with the present invention. The bush 9 is shown to a larger scale in Figure 3.

Referring to Figures 2 and 3, the bush 9 in accordance with the present invention has an annular body which is preferably moulded in one piece from a suitable plastics material.

The annular body has on opposite end faces a projection 14. Each projection 14 extends partly about the circumference of the annular body with the projection 14 at one end being diametrically opposed to the projection 14 at the opposite end.

Preferably each projection 14 extends about the circumference through an angle within the range of about 45° to about 120°. Preferably, when viewed along the axis of the annular body, the projections 14 do not overlap.

As seen in Figure 3, each projection 14 extends continuously about the annular body. This is not essential as each projection 14 could be discontinuous, ie. made up of a series of smaller discrete projections.

When the assembled bush 9 is placed in the seat side plate 11 and the pivot pin 6 then inserted therethrough and attached to the boss 4, the axially opposed shoulders 21, 22 abut against the axial end faces of

projections 14 and cause the bush 9 to tilt or cant. This axis of the bush 9 is therefore inclined by an angle to the axis of bore 18 and so the bush acts to take up the gaps G (Figure 1) created by tolerance stack-up. Thus the bush 9 in accordance with the present invention eliminates or significantly reduces freeplay in the pivot assembly.

The axial extent of the bush 9 (ie. the length from the axial face of one projection 14 to the axial face of the other projection 14) is chosen to be greater than the minimum axial distance between axially opposed shoulders 21, 22 formed on the head of pin 6 and boss 4 respectively.

It will be appreciated that a bush constructed in accordance with the present invention can be used to very good effect in any pivot assembly. Use of such a bush enables a cheaper pivot pin to be utilised as it does not have to be produced to a specific tolerance and the pivot assembly is JIT (Just-In-Time) assembly friendly, i.e. it enables easier/quicker assembly of the pivot assembly.

It will also be appreciated that a bush in accordance with the present invention improves the durability and reliability of the pivot assembly and reduces, if not eliminates, rattle. The bush also reduces production and warranty costs.

CLAIMS

1. A bush comprising an annular body with one end face of the body having an axially projecting projection over part of its surface, and the other end face of the body also having an axially projecting projection over part of its surface, the two axially extending projections being generally diametrically opposed.

2. A bush according to Claim 1, wherein the axially projecting projections are continuous.

3. A bush according to Claim 1, wherein the axially projecting projections are discontinuous.

4. A bush substantially as herein particularly described with reference to Figures 2 ad 3.

5. A pivot assembly including a bush according to any of Claims 1 to 4.

6. A pivot assembly substantially as herein particularly described with reference to Figures 2 ad 3.

7. A vehicle seat having a back which is angularly adjustable with respect to the cushion, the back being adjustable about at least one pivot assembly according to Claim 6.

8. A bush for providing a rotary seat between a bore and a shaft passing through the bore, the bush having a body of annular cross-section, one axial end face of the body having a first axially projecting projection

over part of its surface, the opposite axial end face of the body having a second axially projecting projection over part of its surface, said first and second axially projecting projections being generally diametrically opposed such that when the body is axially compressed, the body is axially inclined relative to the axes of the bore and shaft.

INVESTOR IN PEOPLE

Application No:	GB 0024597.7	**Examiner:**	David Hotchkiss
Claims searched:	1 - 8	**Date of search:**	29 November 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): E2F (FEB)

Int Cl (Ed.7): E05D; F16C; F16F

Other: Online: WPI; EPODOC; JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	US 5725281 A (Jukova Oy) Whole document especially bush 6	
A	US 5553922 A (Aisin Seiki) Whole document bush 4	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.